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Enhancement of the Long-range Ultrasonic Method for the Detection of Degradation in Buried, Unpiggable Pipelines

The objective of this research is to improve and/or enhance a non-intrusive nondestructive technology already in use for pipeline inspections. This technique only requires access to the outside of the pipe. Refits and/or modifications are not necessary to assess the condition of a line using guided wave ultrasonic inspection. The research addresses three primary tasks:

1. To benchmark the test performance of the guided wave method against that of internal inspection vehicles (pigs) and to correlate guided wave data gathered in the field with the actual existing pipe conditions whenever the pipe is exposed for verification or removed for replacement.
2. Improving the guided wave ultrasonic capability to provide more quantitative data on anomalies that require interpretation.
3. And to introduce a new sound beam focusing technique for improved sensitivity and range of inspection.

Progress on this project in the first 21 months was in accordance with the objectives defined for this time period. The following areas were investigated and the results are summarized as follows:

1. Guided Wave focusing was initiated during the 5th quarter. The focusing technique has now successfully moved from the laboratory to field experimentation. Calculations for various pipe sizes using the deconvolution algorithms have been placed in tables for a software lookup and the supporting software created. These have been shown to work well enough that the production software is now undergoing beta testing. Real field tests are continuing on in-service pipe with the reconfigured guided wave equipment set and software developed to facilitate sound focusing. During the last three periods the equipment and software have been upgraded as advancements have been made.
2. Guided wave inspections are now being performed on existing pipelines. Field situations where anomalies are identified are being evaluated by direct comparison, i.e., guided wave data vs. as-found pipe condition. These data are being logged and described for further study. So far, 630 of feet of condemned pipe has been studied and the field results correlated with the actual pipe condition and three of three cased pipe sections have been inspected and verified. Additional inspections are now scheduled for the fall of 2004.

Questions concerning this project should be directed to the Team Project Manager as follows:

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